

CLAIMS

1. A measuring apparatus which measures a hole formed in a workpiece, comprising:
 - a holding mount which holds a workpiece and has an injection port for injecting a gas into the hole formed in the workpiece;
 - a ball which is inserted into the hole formed in the workpiece;
 - an elastic member which elastically supports the ball;
 - a converter which converts back pressure of the gas injected from the injection port into an electrical signal; and
 - a control unit which calculates an inner diameter of the hole according to the electrical signal outputted from the converter while the ball is inserted into the hole formed in the workpiece and the gas is injected into the hole.
2. A measuring apparatus which measures a hole formed in a workpiece, comprising:
 - a holding mount which holds a workpiece and has an injection port for injecting a gas into the hole formed in the workpiece;
 - a ball which is inserted into the hole formed in the workpiece;
 - an elastic member which elastically supports the ball;
 - a reflection member which is mounted to the ball and reflects light supplied from a light source;
 - a light receiving unit which receives the light reflected by the reflection member;
 - a moving device which moves the elastic member and the ball along a longitudinal direction of the hole; and
 - a control unit which calculates straightness of the hole by calculating a change of peak position of an amount of light received by the light receiving unit while the ball is inserted into the hole formed in the workpiece and the ball is moved while automatically centripetally moved with respect to the hole by injecting the gas into the hole.
3. The measuring apparatus as defined in claim 2, wherein the reflection member comprises a corner cube.
4. The measuring apparatus as defined in claim 2, wherein the elastic member comprises at least three linear elastic bodies which are parallel to each other.

5. A measuring apparatus which measures a hole formed in a workpiece, comprising:
 - a holding mount which holds a workpiece and has an injection port for injecting a gas into the hole formed in the workpiece;
 - a ball which is inserted into the hole formed in the workpiece;
 - an elastic member which elastically supports the ball;
 - a converter which converts back pressure of the gas injected from the injection port into an electrical signal;
 - a reflection member which is mounted to the ball and reflects light supplied from a light source;
 - a light receiving unit which receives the light reflected by the reflection member;
 - a moving device which moves the elastic member and the ball along a longitudinal direction of the hole; and
 - a control unit which calculates cylindricity of the hole according to the electrical signal outputted from the converter and data of a change of peak position of an amount of light received by the light receiving unit while the ball is inserted into the hole formed in the workpiece and the ball is moved while automatically centripetally moved with respect to the hole by injecting the gas into the hole.
6. The measuring apparatus as defined in claim 5, wherein the reflection member comprises a corner cube.
7. The measuring apparatus as defined in claim 5, wherein the elastic member comprises at least three linear elastic bodies which are parallel to each other.
8. A measuring apparatus which measures a hole formed in a workpiece, comprising:
 - a holding mount which holds a workpiece and has an injection port for injecting a gas into the hole formed in the workpiece;
 - a ball which is inserted into the hole formed in the workpiece;
 - an elastic member which elastically supports the ball;
 - an optical fiber which is attached to the ball and carries and projects light supplied from a light source;
 - a light receiving unit which receives the light projected from the optical fiber;

a moving device which moves the elastic member, the ball, and the optical fiber along a longitudinal direction of the hole; and

a control unit which calculates straightness of the hole by calculating a change of peak position of an amount of light received by the light receiving unit while the ball is inserted into the hole formed in the workpiece and the ball is moved while automatically centripetally moved with respect to the hole by injecting the gas into the hole.

9. The measuring apparatus as defined in claim 8, wherein the elastic member comprises at least three linear elastic bodies which are parallel to each other.

10. A measuring apparatus which measures a hole formed in a workpiece, comprising:

a holding mount which holds a workpiece and has an injection port for injecting a gas into the hole formed in the workpiece;

a ball which is inserted into the hole formed in the workpiece;

an elastic member which elastically supports the ball;

a converter which converts back pressure of the gas injected from the injection port into an electrical signal;

an optical fiber which is attached to the ball and carries and projects light supplied from a light source;

a light receiving unit which receives the light projected from the optical fiber;

a moving device which moves the elastic member, the ball, and the optical fiber along a longitudinal direction of the hole; and

a control unit which calculates cylindricity of the hole according to the electrical signal outputted from the converter and data of a change of peak position of an amount of light received by the light receiving unit while the ball is inserted into the hole formed in the workpiece and the ball is moved while automatically centripetally moved with respect to the hole by injecting the gas into the hole.

11. The measuring apparatus as defined in claim 10, wherein the elastic member comprises at least three linear elastic bodies which are parallel to each other.